Virtual Institute of Integrated Climate and Landscape Evolution Analyses

ICLEA

Partner

- ❖ *Helmholtz-Zentrum Potsdam Deutsches GeoForschungsZentrum GFZ*

   Sektion 5.2 Klimadynamik und Landschaftsentwicklung
   Sektion 5.4 Hydrologie
   Sektion 5.1 Geoökologie und Geomorphologie
   Sektion 1.4 Fernerkundung

- ❖ *Ernst-Moritz-Arndt-Universität Greifswald*

- ❖ *Brandenburgisch Technische Universität Cottbus*

- ❖ *Polish Academy of Science*

Motivation

Events and trends in today's environmental change

What are the consequences and how to anticipate future changes?

We do not know

(1) the system variability and potential amplitudes
(2) driving processes and mechanisms and their interaction

Motivation

> „Climate models tend to underestimate the size and extent of past abrupt climate changes".
>
> *(IPCC Report, 2007)*

Main Scientific Hypotheses

Present day environmental changes are governed by a **complex interaction of factors** including climatic and past landscape evolution including human impacts.

We need to understand **critical threshold processes** in past climate and landscape evolution to improve model-based predictions.

A new interdisciplinary approach integrating climate and environment data on **different spatio-temporal scales** is necessary to surmount evident knowledge gaps in process understanding.

ICLEA Structure

5 Work Packages

- o Hydrological and climate data

- o Archive remote sensing data

- o Tree ring archives

- o Lake sediment archives

- o Soild and geomorphological data

Research Concept: Landscape as a Natural Laboratory

Institute of Integrated Climate and Landscape Evolution Analysis (ICLEA)

Future

Present

Past

Integrating Time Scales

Instrumental Data
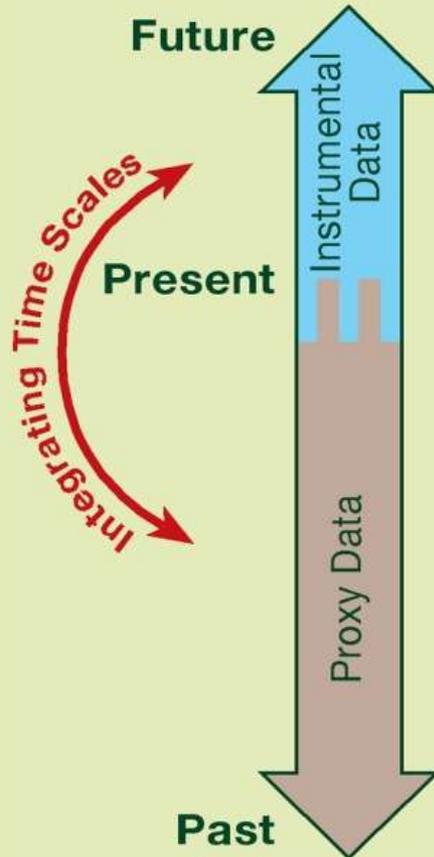
Proxy Data

Geosystem Monitoring:
Hydrology+Soil+Lakes +Trees+Meteorology

WP 1, 3, 4, 5

Documentary and Remote Sensing Data:
Satellite images and aerial photos

WP 2

Proxy Data:
Lakes, Trees, Soil

WP 3, 4, 5
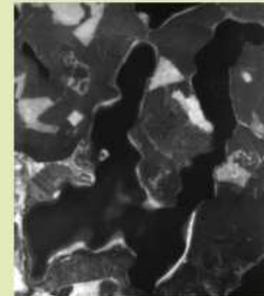
Research Concept: Integrating time scales

1. Increasing the time resolution and dating precision of natural archives
2. Using available observation data of the recent past
3. Integrating proxy data and archive monitioring (TERENO)
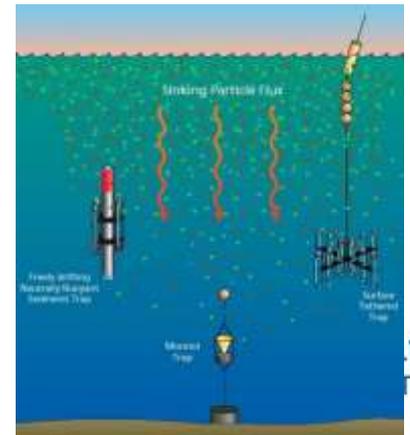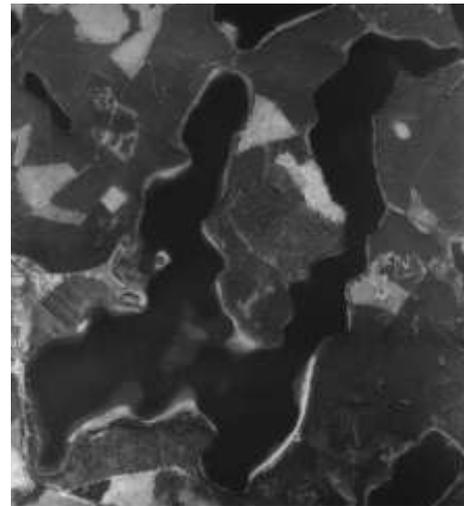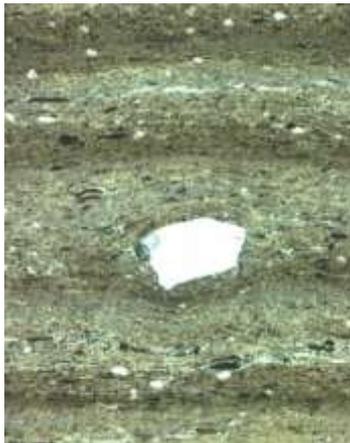
Research Region: Central Northern European lowlands
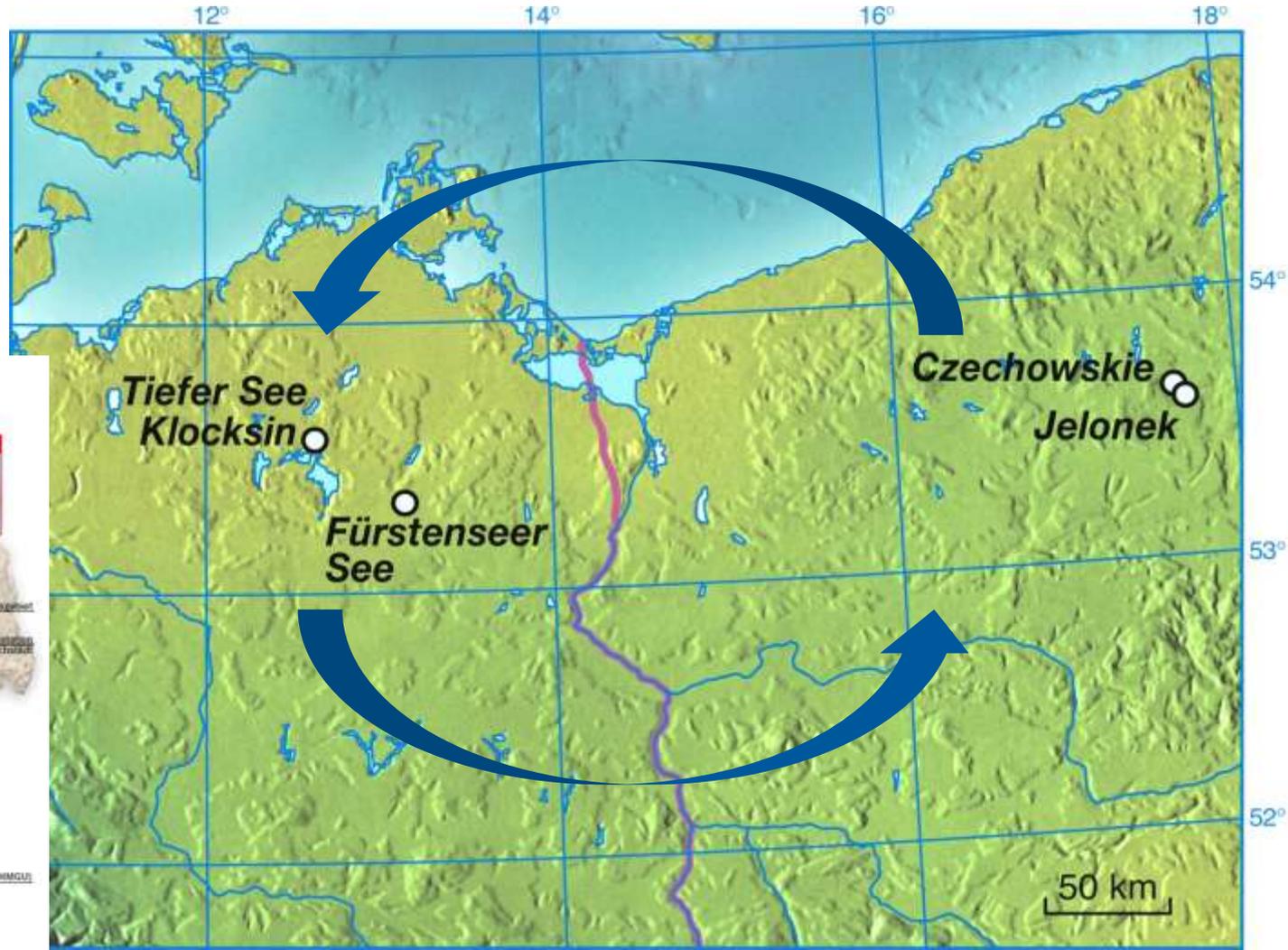
Work Package 1: Hydrological and climate data
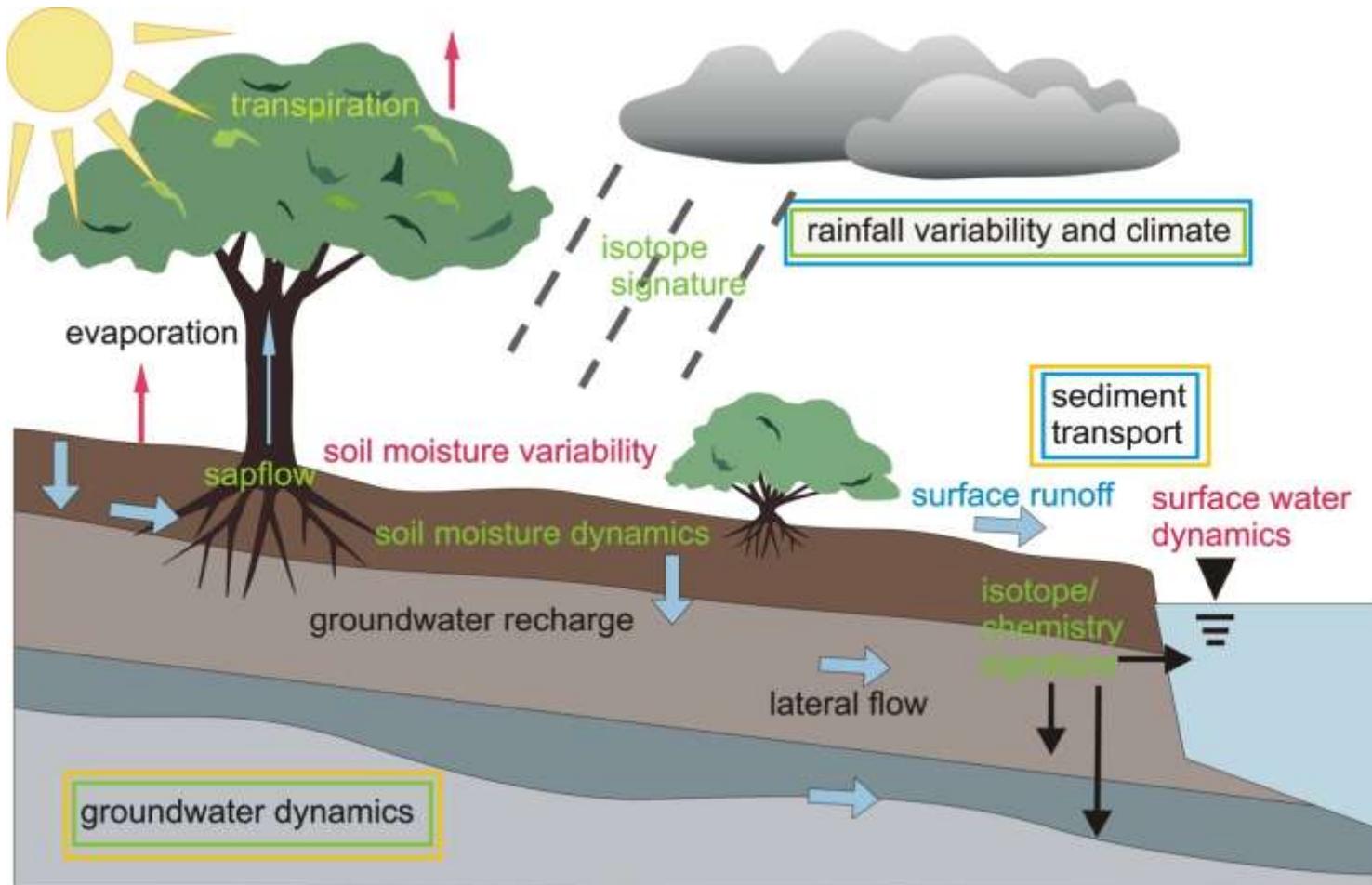
Work Package 2: Archive remote sensing data

Entwicklung der Bedeckungsklassen in der Döberitzer Heide seit 1987
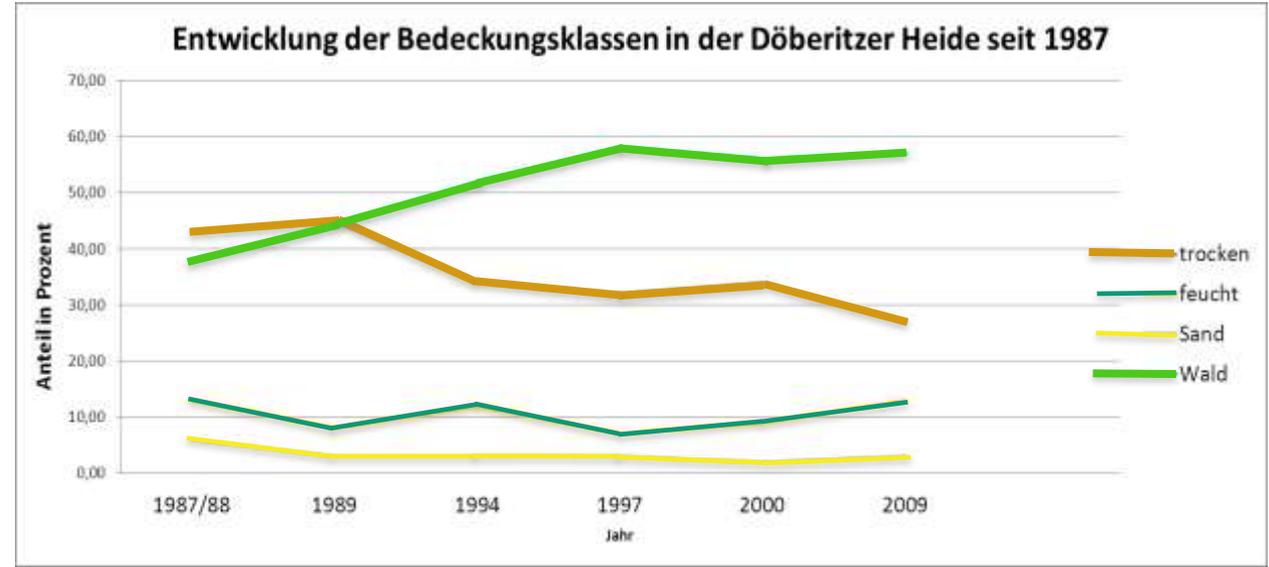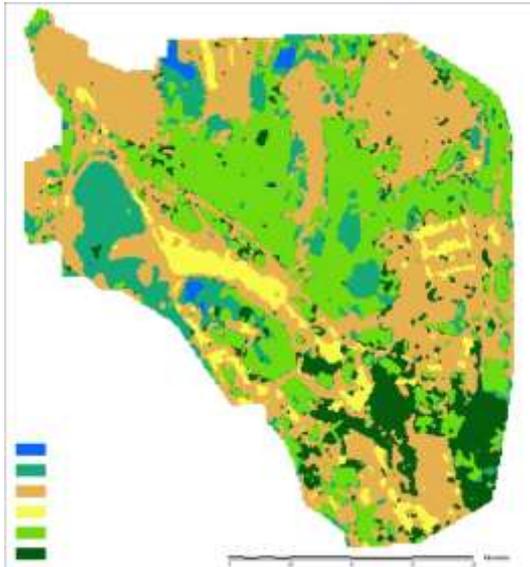
Changes in coverage of main land use type classes in Döberitzer Heide from 1987 to 2009 classes based on Landsat TM/ETM time series

Work Package 3: Tree-rings as natural data loggers

Long hydrological time series using cell size determination

Cell sizes as proxy for water level

Work Package 4: Lake sediments as natural data loggers

Annually layered lake sediments:

determine rates of change today and in the past
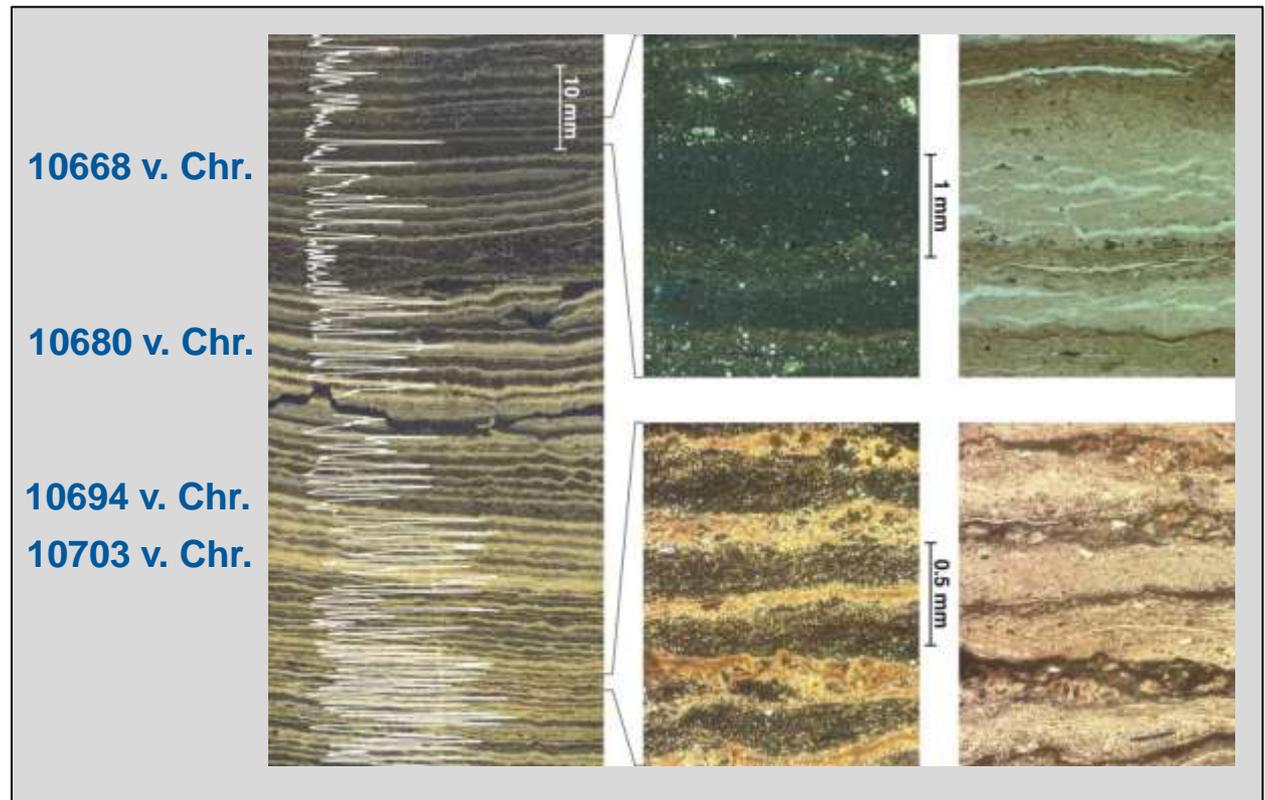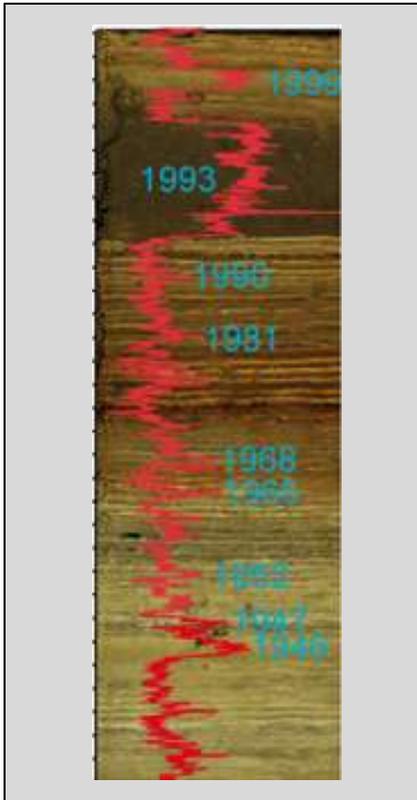
Work Package 5: Soil and geomorphological data

Foto: Nationalpark Müritz

Foto: Vattenfall

Wind-blown sediment

Buried soils

Natural sediment

Different landscapes

similar anthropogenic disturbances

during different epsisodes in the past

ICLEA Networking